

5-1994

**Σary**

Moorhead State University, Mathematics Department

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## **Legg Resigns as Chair, Jeppson Chosen**

**Dr. Milton Legg** announced his resignation as chair of the mathematics department last spring, after serving in that capacity for seventeen years. During his time of leadership a majority of the present department faculty members were hired, and the department grew considerably, both in terms of students enrolled and faculty size. Perhaps the best indicator of his success as chair is the length of time he continued in that position. Dr. Legg is now enjoying "just teaching".

The department elected, and the President appointed, Dr. Ronald Jeppson to take over as department chair. Dr. Jeppson joined the faculty at Moorhead State in 1981, after completing his Ph.D. in approximation theory at Montana State University. In addition to teaching and advising, Dr. Jeppson has had extensive contact with students as faculty supervisor for the annual mathematical modeling competitions.

## **New Faculty Hired**

**Dr. Mahinda Karunaratne** joined the mathematics faculty at Moorhead State University in September of 1993. Dr. Karunaratne received his Bachelor of Science degree in mathematics from the University of Colombo in Sri Lanka. His Master of Science degree in statistics was earned at Southern Methodist University in Dallas, Texas and he completed his Ph.D. in Statistics at Texas A&M

University in College Station, Texas. Dr. Karunaratne served as a visiting professor in the Department of Applied Statistics and Operations Research at Bowling Green State University in Bowling Green, Ohio before coming to Moorhead State University. His research interests are in Biostatistics, Epidemiology, Sampling and Survey Methods, Errors in Variables, and Density Estimation.

## **Christine McLaren Named Fellow of the American Statistical Association**



**Christine McLaren** was named a Fellow of the American Statistical Association (ASA) in a presentation ceremony at the Joint Statistical Meetings in San Francisco in August of 1993.

The designation of Fellow is a singular honor and has for more than 75 years signified an individual's outstanding professional contribution and leadership in the field of statistical science.

Dr. McLaren has been a member of the mathematics department at Moorhead State University since 1986.

## **Update on Fermat's Last Theorem**

*by Prof. Dennis Rhoads*

In 1637, the great French mathematician Pierre de Fermat wrote in the margin of his copy of Diophantus' *Arithmetica* the following comment. "it is impossible to write a cube as a sum of two cubes, a fourth power as a sum of two fourth powers, and, in general, any power beyond the second as a sum of two similar powers. For this, I have a truly wonderful proof, but the margin is too small to contain it." Fermat was asserting that for  $n > 2$ , the equation  $x^n + y^n = z^n$  has no solutions in the positive integers. This result has come to be known as Fermat's Last Theorem.

During the following 356 years, some of history's greatest mathematicians failed in

their attempts to prove Fermat's Last Theorem. Then, last June, Princeton mathematician Andrew Wiles announced in a series of three lectures at the Isaac Newton Institute in Cambridge, England that he had solved the problem. His 200-page proof, not yet published, is actually a proof of the Taniyama-Shimura conjecture about elliptic curves. In 1986, Berkeley mathematician Kenneth Ribet published a proof that the Taniyama-Shimura conjecture implies Fermat's Last Theorem. The day that Dr. Wiles heard about Dr. Ribet's result, he dedicated his life to proving Fermat's Last Theorem. He worked on this project, in secret (only one other person, sworn to secrecy, knew of this project), exclusively for seven years. "I don't think I ever stopped working on

it. It was on my mind all the time. Once you're really desperate to find the answer to something, you can't let go," said the 40 year old Dr. Wiles, who first became interested in mathematics when he came across Fermat's Last Theorem when he was 10 years old.

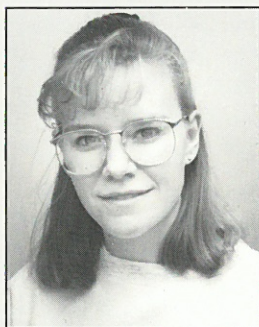
Actually, the proof is not yet complete as it now stands. Dr. Wiles has acknowledged a gap in the proof but is confident that he will soon be able to complete the proof. If Dr. Wiles is unable to eliminate the gap in his proof (he has turned down an offer by the Gap, the jeans company, to pose for an advertisement), I myself have discovered a truly wonderful proof but this newsletter is too small to contain it.



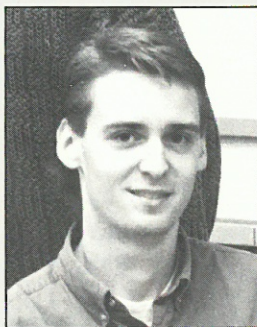
## Mathematics Students Receive Awards

### Three Chosen for Senior Awards

The Mathematics Department recognizes Lisa Anne Erpelding, Connie Skarphol, and Scott Waldner as outstanding seniors this year.



**Connie Skarphol**, a graduate of Springfield (Minnesota) Public High School, is the daughter of Lloyd Skarphol and Judy Ochs. She is a transfer student from the University of Minnesota-Morris. Besides being a mathematics major she also has a minor in Business Administration. Connie is interested in becoming an Actuary upon completion of her college degree. She has already passed her first actuarial exam and plans to take the second one in May. Connie has chosen membership in the Mathematical Association of America as her award.



**Scott Waldner**, from Rochester, Minnesota, is the son of Mr. and Mrs. Eugene Waldner and a graduate of Huron High School. Scott majored in both mathematics and computer science. He graduated from MSU in fall 1993 and is currently employed with IBM in Rochester. Scott has chosen membership in the Mathematical Association of America as his award.



A graduate of Totino-Grace High School in Fridley, Minnesota, **Lisa Anne Erpelding** is the daughter of Kenneth and Judith Erpelding of Columbia Heights. In addition to her mathematics major she will also earn a degree in Spanish. Lisa completed her student teaching program at Pharr-San-Juan-Alamo School District in Texas. She has enjoyed tutoring at MSU and plans to be a mathematics and/or Spanish teacher after graduation. Lisa has chosen membership in the Mathematical Association of America as her award.

### Vanessa Jones Receives Ritchie Award

**Vanessa Jones**, senior mathematics major from Sierra Leone, is this year's choice for the Bill V. Ritchie Award for graduate study. Ms. Jones is the daughter of William and Clarice Jones of Freetown, Sierra Leone, where she attended Annie Walsh Memorial School and the Lebanese International School. She plans to study applied mathematics, and has been doing undergraduate research in statistics with Dr. McLaren.

## Mathematics Education Grants and Classes

Mathematics educators in northwestern Minnesota middle schools returned to the Moorhead State University mathematics department on February 2, 1994, to report on projects they carried out in their classrooms following a summer of '93 campus workshop "P3, Patterns, Processes, and Problem Solving." The workshop was funded under an Eisenhower Grant written by Jane Schobel of the MSU faculty with Vernon Wolff as co-presenter. Activities in Geometry, Measurement and Problem Solving were incorporated into the workshop, which was presented in a cooperative learning format. The workshop was recognized by the National Council of Teachers of Mathematics as presenting the *Standards* in an exemplary manner and was one of eleven in-service activities recognized nationwide to receive a grant for *Addenda Series* books to communicate the mathematics standards to area teachers.

Schobel also wrote and obtained a grant for purchase of *Mathfinder* software for CD Rom to be used in future in-service activities and also for pre-service teachers at Moorhead State. The *Mathfinder* software is a compilation of over forty study projects in mathematics during the past thirty years that have been conducted in the nation. It contains lesson plans on virtually any topic in mathematics and is particularly useful for research in mathematics curriculum. Wolff will be teaching a graduate level course this summer at MSU for K-8 teachers from June 13 to July 1. The course, entitled, "Trends and Issues in Elementary School Mathematics", will be for 3 graduate credits. To obtain additional information about the course, contact Vernon Wolff at MSU Box 54, Moorhead State University, 1104 7th Ave. So., Moorhead, MN 56563 or call (218) 236-4006.



## 1993-94 Honors Apprentices

During the 1993-94 school year, five students in the Honors Apprentice Program at MSU have been assigned to members of the mathematics department:

**Stephanie Aakre**, a junior mathematics major who graduated from Dilworth High School, has been working with Dr. Timothy Peil on researching problems in graph theory and combinatorics to write supplemental lessons for Math 125—Contemporary Mathematics. During this spring quarter, she is on Euro-spring.

**Chris Copeland**, a sophomore mathematics major from Granite Falls, Minn., is working in the mathematics tutor room under the direction of Dr. S.J. Drouilhet. He has obtained a summer actuarial internship at Minnesota Mutual, St. Paul, Minn.

**Marivel Danielson**, a sophomore mathematics major who graduated from Fargo North High School, is working with Dr. Derald Rothmann on introductory topics in graph theory and combinatorics. Considerable time and effort was put into studying "Matching and Stability Theorems" and in investigating "Maximum Flow Problems".

**James Gilbert**, a physics major from Sioux Falls, S.D., is working with Dr. Vernon Wolff. Besides tutoring students, Jim has written a user-friendly handbook for accessing information from the MATHFINDER CD. This is a valuable resource that catalogs over 40 math curriculum projects in relation to NCTM Standards. Jim has also developed an annotated listing of elementary picture and/or story books of mathematical concepts that are available through our curriculum library. In addition, Jim has helped set up and facilitate/monitor activities for the elementary and secondary mathematics lab.

**James Johanson**, a freshman math major from Corono, S.D., is working with Dr. Peiyi Zhao. He has studied several topics in basic graph theory and problems related to Euler circuits, Hamilton circuits, trees, directed graphs, and planar graphs, and questions concerning matching, relations, and map coloring in the Fall quarter; in the Winter quarter, he worked in the Math department's tutor lab to help students from Math 125 classes. He will study several software packages and the use of CAS in teaching/learning calculus in the spring quarter.

## Statistical Research Projects Blend Mathematics With Medicine and Education

This year we celebrated the impact of the mathematical sciences on the life and health sciences during Mathematics Awareness Week. The interface between the mathematical sciences and the biological sciences can be seen in the research projects undertaken by mathematics majors **Corey Johnston**, **Vanessa Jones**, and **Jim Askin** and mathematics graduate **Ed Kambour**. Joined by mathematics major **Brock Stenberg**, who completed a research project in statistical education, they elected to work on research projects in statistics with Dr. Christine McLaren. They met each week as a group to discuss their progress, share discoveries, seek advice, and gain energy for the next week's work by eating glazed doughnuts! They were able to work together on problems such as finding a simultaneous test procedure for the slope and intercept of a regression line. They puzzled over practical problems, spent hours analyzing data, and found that statistical computing can consume an inordinate amount of time. Each improved his or her expertise with computer packages. Individuals in the research team derived new statistical theory, assisted in statistics classes, wrote extensive statistical reports, submitted abstracts to meetings, made presentations at regional and national conferences, and published a research article.

**Corey Johnston** is a senior mathematics major from Pierre, SD. His project grew out of questions posed by the Chief of Pathology and Laboratory Service of the Department of Veterans Affairs in Fargo, ND. Dr. Akiko Saberi wanted help assessing the reproducibility of a newly purchased laboratory instrument used in common



*Left to Right: Brock Stenberg, Vanessa Jones, Corey Johnston, Ed Kambour, Jim Askin*

blood tests. For the project, Johnston modified a statistical protocol, including the appropriate use of histograms, scatterplots, confidence intervals, goodness of fit tests, and correlation and regression analysis. Some of his activities included theoretical study of statistical techniques, talking with laboratory personnel concerning data collection, analyzing the data using statistical programming languages, and reviewing results with the laboratory director. Johnston and McLaren published their research in *STATS*, the Magazine for Students of Statistics. In addition Johnston presented a paper, "Statistical Methods for the Assessment of Laboratory Instrumental Performance," at the Fourth Argonne symposium for Undergraduates in Science, Engineering, and Mathematics held



in November of 1993 in Argonne, Illinois. He also presented a paper based on his research in the Winchell competition, held during the Minnesota Academy of Science meeting in Moorhead, Minn., April 30, 1994. In part because of his experience with statistical research, Johnston has received a fellowship for graduate study in statistics at Oregon State University.

**Vanessa Jones**, a senior mathematics major from Sierra Leone, chose to work on another project in laboratory medicine. For decades, many laboratories have performed common laboratory tests in duplicate to ensure accuracy of results. With the emergence of more precise laboratory instruments, the need for duplicate testing has diminished. However, the practice of duplicate testing is still common. The major goal of Jones' project was to determine if single testing could replace duplicate testing when using the Medical Laboratory Automated (MLA) hematology analyzer or the Sysmex Coagulation Analyzer (CA) for laboratory tests that measure blood clotting time. Jones wrote a series of Minitab macros and applied a statistical protocol to data provided by Dr. Berend Houwen of Sysmex Corporation. She found both the MLA and CA hematology analyzers provide reproducible test results and concluded that for the range of the data examined, duplicate testing was unnecessary. Jones presented her work in the Winchell competition this April, in a paper entitled "Is Duplicate Testing of Common Laboratory Tests Essential?"

**Jim Askin**, a senior in mathematics from Detroit Lakes, studied the relationship between increased levels of iron and therapy for cerebral malaria. Cerebral malaria and coma are severe complications of *Plasmodium falciparum* parasite infection. It is known that iron is a nutrient for the growth of *Plasmodium falciparum* and malaria infection might tend to raise circulating iron levels. Iron chelation therapy with deferoxamine and quinine hastens the clearance of parasitemia and enhances the recovery from coma. The goal of Askin's project was to determine the effect of therapy on children with coma and markedly elevated iron levels. He used statistical modeling techniques to analyze treatment results on 81 Zambian children with cerebral malaria. Askin found that among children given placebo and quinine the rate of recovery among the 25 children with normal iron levels was 3.3 times that of the 14 children with elevated iron levels. For the remaining 42 children, deferoxamine treatment increased the rate of recovery from coma for the 19 children with elevated iron levels to the equivalent of 23 children with normal iron levels. Askin was selected to present his work at the Eighth National Conference on Undergraduate Research held at Western Michigan University, April 14-16, 1994. He also gave a paper in the Winchell competition at the Minnesota Academy of Science meeting.

**Ed Kambour**, an MSU graduate in mathematics from Rapid City, SD, worked this year as a research assistant for Dr. Christine McLaren and her husband Dr. Gordon McLaren of the University of North Dakota and the Department of Veterans Affairs in Fargo, ND. Kambour's research included development of statistical methods for sequential analysis of common blood tests. In current practice, physicians mentally compare a laboratory result with previous values and use their clinical judgment to determine the significance of any change. The goal of this project was to aid this process by developing methods to sequentially analyze test results and identify any departure from the past

values of an individual patient. For this project, Kambour derived a theoretical approach for estimation of confidence intervals for patient-specific sequential observations. He also developed graphical techniques for data exploration. Kambour's work served as the basis for a paper that McLaren presented at a meeting of the International Council for Standardization in Hematology, in Miami, FL.

**Brock Stenberg**, a Mathematics Education major from Greenbush, MN, worked with McLaren and Jane Schobel on a cooperative learning project in statistics. Cooperative learning involves the instructional use of small groups of students to maximize learning. Research has shown that cooperative learning improves understanding for most students. A recent study supported by the National Science Foundation was designed to test whether using cooperative learning techniques in undergraduate statistics education would enhance learning. Participating in the national study, Stenberg helped with a cooperative learning project that was added to two sections of business statistics at MSU. The goals of the study were to encourage students to take an active part in study design, data collection, data analysis, data interpretation, and reporting of results while working in small cooperative groups. Stenberg served as a teaching assistant and advised students using multiple regression techniques to predict the time between placing an order and receiving the food at fast food restaurants when using the "drive-through" facility. He presented his project results in the Minnesota Academy of Science Winchell competition this Spring in a paper entitled, "Teaching Statistics Using Cooperative Learning Techniques."

Statistical research continues to play an important role in the department by giving mathematics majors a chance to work together to develop new theoretical procedures, learn new statistical techniques, and try hands-on data analysis with the goal of communicating to others the research conclusions.



## Departmental News

**Walter Sizer** presented a paper "Traditional games of strategy and games of chance in Pacific Cultures" at the XIX International Congress for the History of Science held in Zaragoza, Spain in August of 1993.

**Christine McLaren** along with Dr. Guntram Deichsel of Boehringer Ingelheim Deutschland GmbH, were invited to give a paper to the German Cancer Research Institute, Heidelberg, Germany in August of 1993. The title of their work was "African Iron overload as a Risk Factor for Tuberculosis and Hepatocellular Carcinoma". **Jim Askin**, an MSU mathematics student, assisted in the study.

**Don Mattson** and **Ron Jeppson** served as president and secretary/treasurer respectively, of the North Central Section of the Mathematical Association of America for the academic year 1993-94.

**Christine McLaren** was elected to the executive committee, Section on Statistical Education, of the American Statistical Association for 1994-95.

**Christine McLaren** presented the paper "Detection of Sequential Changes in Finite Mixture Distributions" at the 1993 joint statistical meetings held in San Francisco in August of 1993.

**Sayel Ali** attended the International Conference on Mathematical Analysis and Signal Processing at Cairo University, Egypt in January of 1994. The joint paper, with Radwan Al-Jarrah from Southwestern Oklahoma State University, "Sup Norm of Weighted Polynomials: An Alternative Proof" was presented at the conference.

**Corey Johnston**, a senior mathematics major at MSU, presented a paper "Statistical Methods for the Assessment of Laboratory Instrument Performance" at the Fourth Annual Argonne Symposium for undergraduates in Science, Engineering and Mathematics held at Argonne National Laboratory, Argonne Illinois in November of 1993. This paper was a result of research conducted with Christine McLaren.

**Sayel Ali** and **Wayne Chen** were granted tenure in the mathematics department.

**Milton Legg**, **Christine McLaren** and **Jane Schobel** were awarded full year sabbatical leaves for the year 1994-95. **Jim Drouilhet** was awarded a sabbatical for Fall quarter 1994.

**Walter Sizer** presented an invited address, "The Cayley-Hamilton Theorem and Beyond" at the North Central Section meeting of the Mathematical Association of America in October, 1993.

## Recent Publications

**Christine McLaren**, "Analysis of Red Blood Cell Volume Distributions using the ICSH Reference Method: Detection of Sequential changes in Distribution Determined by Hydrodynamic Focusing," *Clinical and Laboratory Haematology* (co-author). **Wayne Chen**, **Brian Ortner** (MSU graduate) and **Jim Askin** (mathematics student) assisted with the study.

**Timothy Peil**, "Criteria for C-disfocality of a Self-adjoint Vector Difference Equation", *Journal of Mathematical Analysis and Applications* (co-author).

**Christine McLaren** and **Ari Wijetunga**, "A Method to Examine the Need for Duplicate Testing of Common Coagulation Tests", *The American Journal of Clinical Pathology* (co-authors). Assisting with the research were former MSU mathematics students Amy Rath and James Jacklitch.

**S.J. Drouilhet**, "Variability in Daily, Zonal Mean Lower-Stratospheric Temperatures" *Journal of Climate* (co-author).

## Alumni News

**Ted Saxman** (71) is an advisory programmer at IBM, working on the next release of midrange IBM AS/400 computers and taking computer science classes at Winona State University.

**Carol L. Cossette** (72) works for the North Carolina Department of Public Instruction as instructional specialist.

**Mike Markert** (72) started his own CPA firm in Bothell, Washington, where he provides a wide range of accounting services.

**Mitch Wimmer** (72) has had his own insurance firm in Detroit Lakes for fourteen years. He and wife Debbi have four children: Matt 18, Jetha 14, Lynnsey 13, and Kayci 10.

**Jerome Teske** (74) is still tending bar in Battle Lake while looking for another job.

**Roger Haglund** (MS Ed 75) is a computer science instructor at Concordia College in Moorhead, and serves as faculty advisor for the college Habitat for Humanity chapter.

**Sheila Ascherman** (76) teaches junior high school mathematics in Willmar. She will complete her master's degree in mathematics education this spring at the University of Minnesota.

**ViAnn Olson** (76) is a mathematics instructor at Rochester Community College.

**Maris Shields O'Connell** (77) and family are in transition, moving to Wisconsin from their former home in Idaho.

**Brian Hanson** (78) is an associate professor of geography at the University of Delaware, studying glacier dynamics with annual fieldwork in northern Sweden.

**Dave Jacobson** (80) works as a staff reliability engineer for IBM while pursuing a Ph.D. in industrial engineering and operations research at the University of Minnesota.

**Claudia (Brainard) Wiebold** (81) lives in Shoreview with husband Don and children Nathan (8) and Carmen (5). She is a master fellow in the Life Management Institute and works as senior systems analyst for Minnesota Mutual.

**Robin Kremer Ladd** (82) runs her own math tutoring business in Herndon, VA, while raising Patricia (6) and Thomas (2). Her husband, Ron, is retiring from the Navy this year.

**Merilee (Sustad) Potucek** (82) just started part time work as desk clerk at the Dekko Community Center in Ada. She and her husband adopted a second child last year, so are parents to Brandon (15 months) and Abbey (3).

**Kirk Scott** (82) serves as assistant professor of Computer Information Systems at the College of St. Scholastica, Duluth.

**Ken Turnquist** (83) works as associate actuary for the Mutual Group in Fargo.

**Sue Haller** (84) teaches mathematics at St. Cloud State while working on a Ph.D. in mathematics education at the University of Minnesota.

**Paul Krzyzaniak** (84) is a computer scientist for the Army in Augsburg, Germany, and is finding it an interesting period in which to live in Europe.

**Wayne Bellefeuille** (85) works as an advanced systems engineer for EDS in Minneapolis.

**Gail Kelm** (85) is finishing her third year as chapter one math teacher in the Bertha-Hewitt district, where she has set up a math lab. Gail is engaged to be married in July.

**Suzann (Dahnke) Olson** (85) teaches math at William Kelley High School in Silver Bay. She and her husband had their third child a year ago.

**Theresa (Fedor) Resnick** (85) works as assistant actuary with Allstate Life in Northbrook, IL. She and husband, Michael, are very proud parents of a baby boy, Peter Jonathan.

**Katie Carlson** (86) continues as math teacher, assistant chief in the volunteer fire department, and driver's ed instructor in Harlem, MT. She also puts her facility with numbers to good use as church treasurer.